HANDHELD ELECTRONIC DATA PROCESSING DEVICE

FIELD OF THE INVENTION

[0001] The invention relates to an electronic device for mobile communication and data processing, and particularly to a handheld electronic data processing device that has a plurality of operation modes for different functions.

BACKGROUND OF THE INVENTION

[0002] Nowadays a PDA phone or smart phone can integrate the functions of a mobile phone and a personal digital assistant (PDA) to provide mobile communication and mobile data processing functions. As operation of functions of mobile communication and data processing are different, the PDA phone or smart phone also has to provide different operation modes for these two functions.

[0003] The mobile phone function has to include a display screen and a phone keypad. The display screen aims to provide related information for mobile communication, including incoming and outgoing phone calls numbers, service provider information, short messages, and the like. The phone keypad aims to take calling phone, dial phone numbers, and edit short messages according to input methods dedicated to the phone keypad.

[0004] The PDA has to include a touch screen to display information. Input is mainly performed by direct selection from a menu on the screen through a stylus and a proprietary PDA program. Input of characters may be done by hand writing through the stylus and the touch screen, or done by a virtual keyboard on the screen. An external QWERTY keypad may also be used to enter input like on a personal computer. In order to speed up input on the PDA, besides the QWERTY keypad, also being developed are hosts with flip covers like miniature notebook computers. Such devices have a display screen and a host body that are separated and hinged on the body. The host body has a QWERTY keypad. When in use, the host may be placed on a desktop, and the display screen may be flipped upwards on the elongated side of the host body to make data entry on the QWERTY keypad easier. For instance, CD-616 and CD-72 electronic dictionaries produced by INVENTEC BESTA Co., Ltd. (reference can be found in http://www.besta.com), MD1000 electronic dictionary produced by INSTANT-DICT Co., Ltd. (reference can be found in http://www.instant.com.tw), Jornada 720 Handheld PC computers produced by Hewlett-Packard Development Company, L.P. (reference can be found in http://www.hp.com) and Zaurus SL-C3000 handheld PDA produced by Sharp Co. (reference can be found in http://ezaurus.com) are portable data processing devices equipped with QWERTY keypads that look like miniature notebook computers.

[0005] To meet the requirements of multimedia applications (such as games, videos, movies, music, and the like) and mobile communication, many manufacturers have introduced flip mobile phones or PDAs that integrate multiple functions, such as MOTORLA model V600 mobile phone (reference can be found in http://www.motorola.com), NOKIA model 7270 mobile phone (reference can be found in http://www.nokia.com). The flip mobile phone or PDA provides a larger display screen or other operation modes (such as including a keypad for data entry). The flip mobile phone has a phone keypad on the host and a flip cover containing a display screen. The flip cover is coupled on the top end of the host through a one-way hinge for opening or folding relative to the host. Although the flip cover can accommodate a larger display screen, the one-way hinge allows the flip cover to swivel only one way, thus limiting the operation mode and creating many inconveniences. For example, when using the keypad for data entry the keypad is narrow and suitable for only one hand input operation after the flip cover is opened, so input speed is limited. Moreover, the keypad mostly adopts a design with shared keys for the phone keypad and QWERTY keypad. Built-in firmware or software must be included to switch the setting for varying input requirements. If a stylus is used to operate on the touch screen, the keypad on the host cannot be hidden behind the display screen. Unconsciously hitting the buttons often occurs and results in interference to the touch screen.

[0006] These days many new mobile phones are equipped with dynamic video and still photography functions. To provide a desired photo mode or other operation modes, the mobile phone with a host and a flip cover coupled by a biaxial hinge has been developed. Reference can be found in U.S. patent publication Nos. 20040110529, 20040132482, 20040192422, and 20040198474. These all provide a mobile phone equipped with a biaxial hinge to enable the flip cover to be swiveled about two rotational axes relative to the host so that the display screen may be turned with its back side folding over the host. Therefore the mobile phone may be used like a digital camera.

[0007] As the PDA phone or smart phone that integrates the functions of mobile communication and PDA generally adopts the structure of the mobile phone or PDA, the biaxial hinge mentioned above is also used on the PDA phone or smart phone to provide different operation modes. For instance, to use the mobile phone function, the flip cover is generally lifted so that the phone keypad may be used for operational control, and the phone is moved close to the user's face during the phone conversation. To use the PDA in a handheld operation mode, the functions of the operation are performed by touching the display screen with the stylus. The host body becomes an obstacle in such a situation, so the display screen may be swiveled with its back side folding over the host. Reference to mobile phones or smart phones that adopt the biaxial hinge to swivel the display screen can be found in U.S. patent publication Nos. 20040203532, 20040203535, and 20040209645.

[0008] The buttons on a typical mobile phone are organized on a phone keypad. Although they may be used to enter characters through software settings, input operation is inconvenient and data entry is slow. Operation by selecting the menu on the touch screen on the PDA is fast, but data input on the virtual keyboard shown on the display screen or through the hand writing mode takes time that slows down the process and creates inaccuracy. To remedy these problems, external QWERTY keyboards have been developed. But the external QWERTY keyboard is not convenient to carry hence it is not suitable for portable electronic devices. The flip cover design that imitates the notebook computer previously discussed usually has the longer side of the host as the rotational axis of the flipping direction, but the mobile phone generally uses the shorter side of the host as the rotational axis of the flipping direction. Hence the design of